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ENERGY AND REALITY

II. The Definition of Energy

WE have tried so far two roads, in order to supplement experience—one, that of independent substances, and the other, that of the idealistic absolute; and both roads have led us to the same goal, the recognition of process as an ultimate fact. We have discovered that "everlasting fixtures," to use Plato's phrase, whether substances or an absolute, will not account for our world. Mass and abstract entities, on the one hand, and perception, on the other, imply "powers" or energies. A thing must be *known*, at any rate, through what it does or can do; it must be defined through its dynamic relations. Elastic balls, geometrical figures, and abstract conceptual entities must be regarded as, at most, convenient shorthand for the ever-restless processes. Although this fact was recognized by philosophy long ago, it is to the actual working necessities of science, from Galileo down, that we owe our present formulation of energy.

But if energy must be regarded as the fundamental fact, what do we mean by energy? It has been customary for the text-books on physics to distinguish between two kinds of energy,—energy as doing work, or kinetic energy, and energy of position or configuration, which has been called potential energy. But this distinction is, after all, merely relative; potential energy is active, too, but in a different way. Whether we shall call energy active or potential depends merely upon our purpose. A body can not be in a certain position without certain energetic interactions; and these are just as real energy as that brought about by the fall of the body. Ether waves may be regarded as potential light sensations, but they symbolize, for all that, actual physical energy. All energy, therefore, does work or is active.

But what do we understand by doing work? This as ordinarily used is not a simple concept, but involves, besides energy, time and space. We must, therefore, try to find a simpler formulation of our concept. In doing work, moreover, is one energy really trans-

formed into a different energy? Take chemical changes as the condition of electricity, or food as the condition of mental energy, can we say here that one form really *produces* another form; that the chemical changes *become* electricity, and food-stuff mind stuff? This, at least, would be difficult to prove; and we must be content for scientific purposes to treat one set of processes as the describable conditions or antecedents of another set of processes. Somehow one set of processes do connect or become confluent with another set. The phenomenal conditions are not the whole story, but they are *our* story, except when we deal with transitions within experience itself. The antecedents may or may not be the same in kind as the consequents; and, as in many cases standards applicable to one set of processes are not applicable to another set, we can not very well speak of identity of energy in such cases. In the case of chemical energy, for example, mass and weight are applicable, but these have no relevancy when it comes to electricity or conative energy. One of the great stumbling blocks in the past to a thorough conception of the energetic wholeness of nature has been the difficulty of imagining how molecular motion could *produce* feelings and volitions. It is this difficulty which leads Clifford and others to espouse the meaningless doctrine of parallelism. But we appreciate now that the difficulty of production would be about as great in molecular motion producing electricity. Hence the old difficulty appeals to us less. Parallelism of facts or energies would mean that one set of energies could make no difference to another set. Parallelism to our purposive energies would, therefore, mean absolute ignorance. And, on the principle of parsimony, or any other sensible principle, we would have no right to assume such energies. All that is needed, however, is that we should have describable conditions, or that one set of processes should make a predictable difference to another set. If processes in their sequences satisfy certain expectancies, or have such uniformity as enables us to adjust ourselves to the future, that is the only conception of energy with which we are concerned. The possibility of ultimately simplifying energy into one form we shall deal with later.

If we define energy, with Lotze, as determinate position, we must not forget that energy involves happening, that it is fundamentally process. Lotze strives hard to get rid of space or externality, and to reduce the energetic positions to phases within a spiritual whole, to a polyphonic esthetic unity. With a conception of energy which strives to get rid of energy, we are not here concerned.

It will appear on closer scrutiny that the concept of energy is a dual concept involving *process* or stuff, on the one hand, and *constancy* or *uniformity* of processes, on the other. This has some-

times been ignored, and it has been supposed that mere constancy exhausts the concept.[1] It we look at the process side, we find it convenient to recognize qualitative differences of processes. Chemical processes, for example, are different from neural; and again, among chemical processes we must distinguish some seventy or eighty elements which so far have remained irreducible to each other. Take the mere field of sensations, and we must distinguish some fifty thousand different processes. If we look again at the constancy aspect of our concept, we must not regard this as a mere subjective habit, with Hume, or a category of substance, with Kant; but we must regard the relative uniformity of processes as real as the processes themselves and inseparable from them, forced upon *us* and not upon the processes. It will be apparent now that the concept of energy is a very complex concept. We can only hope to offer the most provisional kind of definition. Let us lay it down, then, that energy is such a uniformity or constancy of processes as makes prediction of the behavior of things under definite conditions possible. As our knowledge of the external world depends upon perceptions, we may say that nature consists of such predictable processes as can appear in our actual or possible experience.

That does not say that energy is nothing but perceptual uniformity, but only that we are dependent for our immediate data upon such perceptual processes. Hume is right, as over against Berkeley, that we must assume "powers," and not mere perceptual qualities; but he is not right in calling these altogether unknown "powers." That depends upon what we mean by knowing and the powers we are talking about. The powers, to be predicated at all, must be capable of making differences to other "powers" under certain circumstances. Among these are the differences they must make to our own human nature. We can know these powers, in some sense, at least, viz., in so far as they react upon each other and, most important of all, upon our psychophysical organism. The real must *seem,* in order to make science at all possible. In the case of nature processes, however, we must be satisfied with a knowledge of their external continuities, with the differences which they make *to us;* we can not have access to their own inwardness. This is only possible in the case of conscious beings like ourselves. The inner reality of energy is not something we can sense, but something which must be acknowledged. The inner significance of the process must be furnished by the constructive imagination—using the sense energies as signs and tests in its ejective procedure. It is anthropomorphic, in the worst sense, to suppose that our strain and resist-

[1] This seems to be the idea of Poincaré in his brilliant book "Science and Hypothesis." See especially p. 132 (English translation, 1905).

ance sensations from joints and tendons can be read into the objective processes of nature. All we can say about nature is that certain rearrangements appear to us in certain ways and can be predicted and, to a certain extent, controlled by our wills. It is in our consciousness of fulfillment of purpose that energy becomes a real activity and not a mere artificial piecing-out of what goes on behind the scenes. In our own purposes the reality of the process is revealed to us first-hand; the rest is interpretation and conjecture.

But is energy anything more than a collective name for those uniformities or describable conditions which can be established through experience? The passion for simplification is one of the deepest and most universal passions of human nature; and there always will be a tendency, no doubt, to find some *Urstoff* in terms of which all this variety of process can be expressed. And so we have our vortex hypothesis; our atomic hypothesis; the various spiritualistic hypotheses, such as the will theory of Schopenhauer; and the more modest agnostic attempts, such as the double-faced unknowable of Spencer, which is truly void of expression in both its faces, the physical and the psychological, stolid as an Oriental. The history of philosophy and of science, from Thales down, might almost be written in terms of this quest for *Urstoff*. We have substituted, to be sure, energy for substance; but have we really simplified matters so far as finding an identical basis is concerned? Does not the fancied unity of energy break into pieces in our hands, as much as the older theory of substances? Have we not been misled by the *name* of energy into supposing that we have discovered real identity? When we fancy that we have identity, have we not introduced additional determinants to meet the variety of facts, and is not the real complexity as great as before?

This, at least, seems to be the case with the motley array of energies with which Ostwald entertains us.[2] I can see no unity here except the name on which all the Protean types are strung. We must at least find a more fundamental unity than a mere term can furnish. Do energies all do work? Very well, it is through the *difference* of the work they do or through the difference of the effects which they occasion that we know them or identify them. Ostwald has, after all, succeeded in saying nothing more than that one set of changes, under certain conditions, is followed by another set of changes. He has said nothing about the real nature of the processes; his energies are nothing but classifications of expectancies, an enu-

[2] W. Ostwald, "Vorlesungen über Naturphilosophie," 1902; also "The Philosophical Meaning of Energy," *The International Quarterly*, Vol. VII., p. 300.

meration of various types of uniformity. The best he has done is to emphasize that one set of processes can make a difference to another set of processes throughout the whole scale of cosmic changes; but his whole account deals merely with the phenomenal side of the processes, not with the metaphysical side. This is nowhere more apparent than in his absurd attempt to deal with purposive experience as a derived or composite type of energy. We shall recur to this later.

When it comes to establishing the number of kinds of energy or the identity of energy, we must proceed, not by *a priori* assumptions or mere esthetic predilection; we must fall back upon the pragmatic test, viz., How many kinds of energy are needed to account for the diversity of our facts? Simplification and the discovery of greater diversity here have gone hand in hand. While successful in reducing light and magnetism to the category of electricity, new phenomena in the way of radioactive substances have appeared. Only one universal formula can so far be laid down with any degree of certainty, viz., that all known energies are capable, under describable circumstances, of making a describable difference to each other. In this sense the universe may be said to be energetically one.

In the attempt to simplify energy, two forms of cleavage have been particularly obtrusive. Perhaps the greatest drawback to the simplification of energy has been the distinction between physical processes, on the one hand, and conscious processes, on the other hand. It has rightly been insisted that the generation of consciousness from non-conscious processes must be an ultimate mystery. This objection to the energetic continuity of the world, if not its identity, I have tried to remove in another paper on "Consciousness and Reality."[3] In this I have tried to show that consciousness is not a form of energy, but must be regarded as an independent fact or dimension of reality; that the difference which consciousness makes, namely, that of awareness, does not involve any variation in consciousness, but in the complexity of the energetic conditions; that psychic processes, therefore, as processes, can make differences to other processes and can vary with them, quite irrespective of consciousness. To avoid misleading associations I have called this psychic activity conative energy, which, it will be recognized, may be either conscious or unconscious, may be either tendency or meaning, according to the conditions. While such a theory has nothing to do with deciding the question of an ultimate *Urstoff* or identity of energy, it does take away the greatest conceptual obstacle to energetic relations. It may still remain true that conative energy is fundamentally different from chemical or electrical energy. Phys-

[3] This JOURNAL, Vol. V., p. 232.

ical energy still remains an X, so far as its inside is concerned, and does not become psychological processes. We may know a great deal about its workings, its predictability, and manipulation, but we know nothing first-hand about it. It is only a name for certain constancies or uniformities of perception, which make prediction possible; but our knowledge of it to the end remains phenomenal. This X we may divide into X's according to convenience, in dealing with the perceptions and uniformities of nature. Thus it may be convenient to treat the X which manifests itself to perception as mass and weight as different from the X of electricity, to which mass and weight are not even phenomenally applicable. How many X's we need, how many types of constancy, must be determined in the process of the adjustment of our purposes to the larger world.

The other great obstacle to simplification has been the cleavage as between energies where mass and weight can be applied as measures, as in the case of mechanical and chemical processes, and energies where no such units can be applied, as in the case of electrical and nervous energy. The vigorous attempt to bridge the gulf between mass energies and electrical energies we have referred to in our discussion of mass.

The brilliant work in regard to the atom by such men as J. J. Thomson, Rutherford, and others shows that atomism is not a dead issue, but is still to be reckoned with. You can not brush aside atomism by the mere dogmatic wave of your hand to the effect that reality is one and undivided, as has been assumed in Spinoza's "extension," Schopenhauer's "will," the Vedānta "self," and other poetic efforts. Such questions can be settled only with reference to the demands of experience; and the success of atomism must depend upon whether it can be shown to have a basis in facts.

But there is little in common between this present atomism of the electrical school and the old atomism. In the new atomism energy has become the chief interest rather than mass or weight, and it has been confidently asserted that these can be reduced to motion and distance. The atom is no longer regarded as eternal and indifferent, but is the storehouse of pent-up energy of enormous quantity, though, as in the case of radium, it may be in a very unstable equilibrium. Instead of extended bits, we have now to deal with electrical charges of a positive and negative kind, although it may still be convenient to speak in terms of particles or corpuscles as vehicles of charges. Instead of the mythological "bonds" of an older chemistry, we have the relation of these positive and negative charges to each other, the former accounting for the relations between the charges within the atom, while the latter, being more

diffuse, account for the form of the atom as a whole. Atomic relations are explained by the fact that atoms can, under certain conditions, receive or expel particles, in the former case increasing their negative, in the latter their positive, charge. By means of this electrical atom and its simpler unit, the electron, which bears very much the same relation as regards distance to the gross atom that interstellar masses bear to each other, the electrical school strives to find a common unit which, through the stability or instability of its component electrons, can account for the scale of physical changes from the ordinary chemical elements to the strange behavior of radium. And it has even been suggested that nerve energy and mental energy are "inductive" relations and can be reduced to electrical phenomena. Thus this school feels that at last the old dream of one ultimate *Urstoff* has been attained. We have, instead of the old mechanical pluralism of the atoms of Democritus, with their dependence upon mechanical contact, a new energetic pluralism which is capable of constituting its own continuum over intervening distances by means of energetic charges, whether within or outside the gross atom of chemistry.

The reason given for the attempt to simplify all matter and energy into terms of electricity has been stated to be that we know something about electrical energy and its relations, while we are ignorant of other kinds; hence the economy in reducing them to electricity. This assumption may well be doubted. To be sure, we have learned a great deal about manipulating electrical energy, but do we really know what electrical energy is? If not, how are we any nearer an explanation? In speaking of mental energy, moreover, as sustaining inductive relations to others, or being radioactive, are we not dealing merely with metaphors of a very questionable kind? I have already referred to the interesting analogies pointed out by Thomson as between the figures assumed by magnets in an electrodynamic field and the periodic law of the elements. But after all, is this anything more than an analogy, however ingenious it may be? Would energies necessarily have to be identical in order to obey the same mathematical laws? As regards the different conductivity of different elements, would this prove, any more than disprove, an electric substrate? Does a man carrying a log necessarily have to be a log? Is not the electrical theory another attempt to reinstate the dogmatic principle of Empedocles, that all action must necessarily be that of like upon like? I can see no reason for admitting any such *a priori* assumption in whatever scientific disguise. For empirical purposes, at any rate, we must recognize ultimate chemical elements and other divisions of energy without thereby prejudicing interaction. And to reduce mental processes

which we know to electrical charges which we do not know is not very illuminating.

The doctrine of *Urstoff* may, after all, be a mistake, a running after a *fata morgana,* a search for the philosopher's stone. It is, at any rate, simpler to assume as many energies as the difference in dealing with the facts makes convenient, and we can not deal with a stone or a mind as though it were electricity. Connecting with a stone or a mind does not produce the same consequences as connecting with an electric current. Even if the characteristic properties of matter, mass, and weight can be reduced to motion and distance, or if the mechanical atom can be regarded as only a half-way house for treating a fact which really consists of electrical charges with their particular and constellation velocities, it still remains true that mass and weight *are* determinants which electric currents do not possess; and it will still be convenient to acknowledge them for descriptive purposes. What we need for epistemological purposes is not *one stuff* or identity of energy, but the possibility of one energy, under statable conditions, making a difference to another, whether of the same kind or not. And so much at least seems clear from present scientific advance. To what degree we can acknowledge identity we must leave to the progress of science.

If we are to start with the known and work from this to the unknown, there is only one place where we can start, and that is with purposive or conative energy. The mistake made by the distinguished physical scientists referred to is in supposing that we do know material energy, especially electrical, and that we can work from this into other realms of energy, including, perhaps, conative. As a matter of fact, the only form of energy of which we know anything first-hand is purposive energy. If we are to simplify, if we are to attempt any form of monism, here would seem to be the place to start, for, on the one hand, this is the only form of energy of which we have immediate awareness; on the other hand, we know this in an indefinite number of stages of complexity, while our knowledge of electrical energy is conjectural at best. We might, too, no doubt, accommodate our mathematics to such a theory of the fundamental nature of things. There would be, for mathematical purposes, nothing more absurd in treating things as made up of conative tendencies than as made up of electrical charges, inasmuch as mathematics in any case is indifferent to the metaphysical stuff of things. And inasmuch as all energies, to be known at all, must make a difference to mind-stuff or our reflective purposes, such simplification would be the only logical working-out of the principle that all action must be of like upon like. It would not be necessary, moreover, to regard this mind-stuff

as feelings, as Clifford does; or as perceptions, as is done by Leibniz. Feelings and perceptions have no meaning apart from consciousness, and we have shown earlier that the larger part of our mental constitution must be unconscious, so far as we know, at any one time. Conative tendency, therefore, as it is the most basic fact of our mental life, affords the additional advantage of not being necessarily associated with consciousness. It is for psychology to describe the laws and sequences of this process of conation, leaving it to philosophy to correlate this energy with other energies of nature. It is not the business of psychology, any more than of any other science, to falsify what it finds, but to give as true an account as it can under the limitations which it sets itself. And such sequences and connections as it sets itself to deal with must in so far be true sequences and laws.

All the interesting speculations which energy admits of elsewhere will be equally available here. Does mind-stuff, for example, act at a distance? Is it radioactive in its nature? Can we account for mass on the basis of non-extended sensations with their simultaneous and successive fusion. Is it, like some other subtle energies, an energy which this earth can scarcely hold? Is it limited to certain neural conditions for being caught and manifesting itself? Here, as in the case of other conceptions of energy, such questions must not be settled *a priori,* but on the basis of evidence. We might take advantage of interesting analogies, at least, from recent science as regards action at a distance. Perhaps there may be relations between mind and mind analogous to wireless telegraphy, as contrasted with the grosser methods of ordinary perception with its end-organs and nerve wires. And not only might we find illustrations of such telepathic connection in the out of the way facts of psychical research, but the social consciousness itself, with its high degree of suggestibility and its sense of companionship and unity, might be the most striking instance of such telepathic action, not to mention the sense of divine presence of which the mystics have made so much. We can not, at any rate, be said to have settled all the possible forms of interrelationship of mind to mind, and there may be subtler ways of connecting up mind centers than have been dreamt of in man's past philosophy, and they may be ways nearest home, too, and not merely pathological; in fact, while we know a great deal more about the inwardness of mind-energy than electricity, we know far less of intersubjective connections than of electrical connections. To use telepathic relations, however, for all psychic interactions, misses the whole point of the distinction, as using radioactivity in such a sense as to make all substances radioactive misses the whole point of the concept of radio-

activity, because in case of such a generalization we would still have to hold that different substances are radioactive or telepathic in very different ways, thus bringing the distinction in through the back door. As regards accounting for mass, again, the mind-stuff theory could probably make as plausible a case as the electrical. We have seen how the sense of mass varies with filling and movement in the case of both visual and tactual sensations, and how it can be generated by velocity in the case of sound. And as for analogies, without respect for evidence, the panpsychists no doubt have the electricians beaten. Behavior, resembling sensitive behavior and even purpose, has been pointed out, not only in the case of organic structures, but in the reactions of inorganic structures, such as the striking phenomena of the chemistry of crystals. Analogies, therefore, would not be lacking on the psychological side.

Whatever poetic charm such a theory of mind-stuff has, it does not help us one whit in meeting the variety and stages of process; and while we must insist that there can be no simplification or classification which does not take into account and make central our purposive energies, yet it does not follow that we can regard reality through and through as purposive energy. We would have to introduce differentia, which would make the supposed voluntaristic substrate a mere word without real meaning. If the materialist has been wrong in reading up, the idealist may commit the same mistake in reading down. So far from this reading down ensuring the place of mind-energy in the universe, it would dissipate its meaning and make spiritual energy indistinguishable from material energy, as in either case the lower will be identical with the higher. This is equally true of Spinoza's "thought," Hegel's "absolute," and Schopenhauer's "will." The failure of materialistic and spiritualistic monism is essentially the same—the failure to discriminate and to meet the differences that we must meet in adjusting ourselves to a universe such as ours, with its complexity and multiform stages. Materialism has been at least as extravagant in its play of imagination as spiritualism. Natural science with its Faraday tubes, its atomic bonds, its affinities and its repugnancies, its thread theories, etc., can at least rival Hegelianism in the realm of fiction. It is safer to stick to the facts and to insist upon spiritual energy where we find evidence of spiritual energy; and at the same time follow the lead of the facts in insisting that spiritual energy can make a difference to the simpler forms of energy, and they to it, whatever in the last analysis these simpler forms may be. All the facts go to indicate continuity within our world; but that is a different thing from identity. About the metaphysical nature of the simpler forms of

energy, we must confess ourselves agnostics, however skilful we may become in their phenomenal prediction and manipulation.

One thing is certain, and in this spiritualistic monism will always have the advantage over any material monism, that purposive energy is the *Urstoff* so far as knowledge is concerned. This purposive energy can not be analyzed or decomposed into sensations, as some have supposed, for sensations themselves are the artificial products of analysis, the abstractions of this purposive will for its own ends. For the will, therefore, to resolve itself into sensations would involve a hopeless circle, a deliberate suicide. With reference to our conative tendencies, the variety of the world, spiritual or material, must be differentiated and systematized. Whatever scheme of stuff we adopt in the end, it is, after all, merely a spreading out of our world for the convenience of the purposive moment. Nothing could be more absurd, therefore, than to regard this purposive energy as an epiphenomenon or as derived in any sense from other energies. On the contrary, our purposive meaning is the only thing which can be known as final. The consciousness of what we are, when we can take account of our own stream of processes, is the only first-hand access to the inwardness of reality. The unity and reality of this purposive moment, therefore, must be regarded as its own vindication. Doubt it and you none the less vindicate the reality of this activity, which can set its own problems and, in a measure at least, solve them. It is this unity of meaning which furnishes the indispensable condition for such coherency and system as we, finites, are able to discover. To make this fundamental insight of conscious experience itself a derivative from chemical changes, shows, on the one hand, a complete ignorance of psychological analysis from Augustine and Descartes down; as it shows, on the other hand, the dogmatic bias of men who, like Ostwald, work in a certain physical field, forgetting that the laws and the unity of the very energy they seek must, in the first instance at least, be the shadow projected upon nature by the reflective moment. This furnishes the undying inspiration for the search for the unity of things.

Modesty, as regards assumptions, would seem to be the final word both as regards the natural scientist and the philosopher. Let us not be misled by the passion for simplicity into supposing that wherever there can be interaction or where one energy can make a difference to another, there must also be substantial identity. Let us be thankful for the brilliant advance in science, which has reduced such seemingly disconnected fields as light and magnetism into terms of electricity; but let us stick close to the facts and acknowledge such differences in the nature of things as the facts demand. Only in this way shall we have workability of hypothesis. The rest is the

poetry of science, interesting amusement for the idle hour—sometimes, perhaps, prophetic of greater victories to come.

For classificatory purposes we might, perhaps, group the different energies into three fundamental groups: material energy, where mass and weight are applicable; electrical energy, including magnetism and light, where we can not apply standards of mass and weight, but where we have less stereotyped conditions; and conative energy, which, like electricity, is immaterial, but which can become self-directive, can have meaning and value. This, however, is merely a convenient classification. It is no causal cleavage, preventing these energies from interacting in nature and forming to that extent one energetic whole.

Such questions as whether there can be action at a distance; whether the cause must be identical with the effect in kind and in time; whether all energy is radioactive; whether the universe can be such a one-way affair as indicated by the second law of thermodynamics,—these questions can not be settled *a priori,* but must be determined by the needs of human experience. I have already indicated the advantage of saving such terms as radioactivity for specific groups of facts. I can not resist the temptation of offering a suggestion or two in connection with the other problems indicated. If we eliminate the contradictory concept of ether, the present status of science would seem to indicate action at a distance; even amongst the electrical charges of the atom we must conceive distances comparable, considering the apparent masses involved, to the distances of interstellar space. No intelligible conception of energy has been able to avoid a certain discreteness of centers; and any medium invented must break up into discrete reactions in order to account for our actual world. There would seem to be no reason, moreover, why space, with its free mobility, should offer any other limitation as regards energetic interconnections than that involved in distance. We seem to be driven, therefore, to an energetic unity of the universe rather than to a one-block theory in order to account, at the same time, for its seeming continuity and diversity.

As to the question of cause and effect, I think I have indicated sufficiently that in order for one set of changes to give rise to another set of changes there is no need of their being identical. Chemical changes do seem to give rise to nerve changes, nerve changes to conative processes, without any need of supposing that bread-stuff is mind-stuff. But we can no more assume that cause and effect must be identical in space and in time than in kind. As I have already said, there would seem to be indications of action at a distance; and if this is the case, there must also be a difference in the time of the cause and the effect. Let us leave out again the fictitious ether,

which, in the words of Poincaré, "if it is able to explain everything, this is because it does not enable us to foresee anything; it does not enable us to decide between the different possible hypotheses, since it explains everything beforehand. It therefore becomes useless."[4] Take, for instance, the connection of a charge from one electron to another. "The perturbation is propagated with a finite velocity; it, therefore, reaches the second electron only when the first has long ago entered upon its rest. This second electron, therefore, will undergo, after a delay, the action of the first, but will certainly at that moment not react upon it, since around this first electron nothing any longer budges."[5] To use a more concrete illustration from the same author. Take a Hertzian oscillator, like those used in wireless telegraphy: "If all the energy issuing from our oscillator falls on the receiver, this will act as if it had received a mechanical shock, which will represent in a sense the compensation of the oscillator's recoil; the reaction will be equal to the action, but it will not be simultaneous; the receiver will move on, but not at the moment when the oscillator recoils. If the energy propagates itself indefinitely without encountering a receiver, the compensation will never occur."[5] I will not enter into the intricacies of mathematical science; but one thing seems certain, that the question of the relation of cause and effect can no longer be settled *a priori*, but must be settled by experimental evidence. To say that the cause *must* be identical with the effect is as unscientific as that the heavenly bodies must move in circles, these being the most perfect figures; or the universe must be a sphere for the same reason.

As regards the theories of a one-way process of the universe as a whole, which is implied in the second law of thermodynamics and in Spencer's famous formula of evolution, as a passing from the homogeneous to the heterogeneous, with the corresponding dissipation of motion, I can not help thinking that the ancient Greeks, in spite of their inferior tools, show a superior imagination. Any theory of the universe based upon a one-sided process, such as the degradation of energy, must assume a finite creation or beginning, in some way; for, if the universe as a whole has no beginning, then any finite process, such as the second law of thermodynamics indicates, must have run its course countless ages ago. The universe must have become stark still; all matter must long ago have become integrated with the corresponding dissipation of motion. The logic of such a theory was long ago expressed in the words of Empedocles: "For if they (the elements) had been passing away continually, they would not be now."[6] Such generalizations, therefore, we must regard as

[4] *Popular Science Monthly*, Vol. LXX., No. 4, p. 348.

[5] *Ibid.*, p. 347.

[6] Line 90, Burnet's translation.

one-sided, though useful makeshifts, considering our ignorance of the total process. That the running-up process may be going on in connection with a running-down process, that motion may be converted into heat, and heat converted back into motion, seems to be illustrated by the recent discovery of the Brownian movement. This may at least serve to break through our scientific dogmatism.

To describe the real world, moreover, with its interactions and its history, we need more than energetic constancies. It is a mistake to suppose that *being,* which we have seen must be understood as processes, is the only attribute of reality. We need space and time, as these processes vary with the time and the distance and are unintelligible otherwise. Without time and space, energy would be congealed—frozen process. We, therefore, must add these as additional dimensions or independent variables of reality. We also must add consciousness as a dimension, since at least part of the behavior of things is conscious behavior, and we have found it impossible to derive consciousness from the non-conscious or to state consciousness as energy. Reality, also, in its motley complexity of changes must possess direction, must have a certain objective form; else all meaning and validity become impossible. This objective form must determine the permanent worth and survival of the finite forms or purposes, individual and social, which arise in evolution. And if they fail to conform or fit in, we may suppose that they are destroyed as forms and that the energies which they held are thrown again, to use a figure from Ibsen's "Peer Gynt," into the ladle of the button moulder to be fashioned into new forms.

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ORGANIC SENSATION AND ORGANISMIC FEELING

THE psychology of attitude is at last getting its right of way. Atomism and psychical chemistry are going the way of mental faculties of the pigeonhole order. Even the biological fashion in our science, useful as it is, must subordinate itself to a psychology of character, a psychology of the whole man. And the study of mental attitudes, trends, tendencies, and the like, will help us to combine "structural" and "functional" and all the other interesting abstract phases of individual unitary character.

In the light of present psychological thought, first-hand accurate data about changing and conflicting mental moods should not come amiss. Hence the following slight study of moods, caught in the act of conflict and change, ought to have a representative value.

As in previous studies of this sort,[1] here, too, the description of the mental states will be kept rigorously free from the writer's comments.

I

Merriment was in the atmosphere. We four grown folk had raced down the hill to the lecture hall as blithesomely as the children in front of us. Some amusing things had happened on the way, so that we were vibrating with suppressed glee as we demurely settled down into our seats.

We had heard the speaker often before, and had enjoyed many a contagious, but furtive, chuckle because of his mannerisms and peculiarities of speech and diction. And he outdid himself that day! Once or twice recently he had unaccountably forgotten one or two of his stock expressions and cant phrases, but on this occasion he promptly brought out his full assortment. I am ordinarily accustomed to behave myself decently, but I find myself this morning quivering with latent vibratory spasms of smiling—inside smiling, that tries to externalize itself into unrestrained laughter. But the usual motives prevent even a fair-sized smile from showing itself. I know that the corners of my lips are being more tightly compressed than is natural to sedate and seemly dignity. But I keep control of myself, and with sufficient ease to enable me to note my experiences carefully.

I have, to a great extent I *am,* a state of diffused suffusion. A sort of gentle, twittering, ticklish, vibrating glow possesses me. Occasionally my diaphragm incontinently wants to heave, breathing tends to become irregular, and the twitching at the corners of the mouth becomes hard to control. But in proportion as I keep down these conspicuous tendencies toward expression, do I preserve the pure mood that can hardly be called pleasurably toned, for it *is* pleasure. As the "feeling" begins to overflow into my big muscles and into the facial muscles of expression, I am conscious of a thickening turbulence of mind that destroys the pure being of the pleasantness. So long as I can without effort prevent an expressive outbreak, the calmly passive and receptive sensitiveness of the mood persists. When I succeed in maintaining the calmness of the mood in spite of some new incongruity in the speaker's utterances, I realize that the pleasure is heightened and that the path to outward expression is blocked. From time to time a diaphragmatic spasm tries to break up the smoothness of the mood, especially when I am conscious that my companions must be amused at the *gaucherie* of the speaker. But a sympathy for that individual, apparently based

[1] See this JOURNAL, Vol. III., pp. 435, 708; Vol. IV., p. 337.

on fellow-feeling, seems to arise in its might and discipline the small-boy responsiveness that makes me want to laugh with my comrades in mirth. I dare not look at my fellow sinners; I am sure that they are feeling as I do and that they, in turn, dare not look at me.

I am fast becoming a victim of a cool and aloof hedonism, when a diversion occurs: two young men rather noisily stamp out of the room. With spontaneity and celerity a new mood comes on. The pleasurable glow dies out, the twittering ticklishness ceases, the calm pleasurable suffusion comes to an abrupt end. I note—a second or two later—that breathing has become altered, that the diaphragm has become braced, not spasmodically, but evenly and securely, that the muscles of the mouth are in firm action, that the teeth are slightly clenched, that a frown has come to the brow. What preceded these manifestaions to which I have yielded quite freely? First, the perception of the boys going out; second, the realization that their conduct is grossly discourteous, *along with* an "all-over feeling" of tension, which *seems to be spreading* to particular muscles, as I wonder at the, to me, remarkable fact that one's mind can so coolly look at some of its own operations, and these, too, of an emotional order! Perhaps long practise has facilitated this internal observation of feelings. Perhaps the aloofness attained in the previously dominant mood has helped me to catch the new one on the fly. Evidently I am indignant, and at the same time studying my indignation. Introspection seems to me such a real process that my mental attitude toward the denial of the possibility of internal observation is like that of the old Scotchwoman's mental posture when she said, "I am open to conviction, but I'd like to see any one that could convince me!" However, these last remarks about introspection do not belong to the story, although passing wonder at the fact of introspection did come upon me at this stage of the game.

The new mood reforms me, for I find myself listening to the speaker and managing not only to follow him, but to gain from him some suggestions of real value. Indeed, I am conscious of distinct exaltation of mood as well as an inclination to perceive and think with the utmost clearness. Calmness has returned, but it is more like the "quiet" of Browning's Caliban than the cool passivity of the first mood. From time to time the speaker says something that ought to rouse the previous mood; but *that* game is played out, though I am conscious of faint twitters and spasmodic quivers from time to time. The internal sensations seem to be supersensitive, but are now rather acute than massive, more definitely localizable, and less indicative of an "organismic" reaction. And so it comes about that I, who was beset at the beginning with a mood first cousin to

scoffing, remained to think seriously about the higher realities and idealities; and perhaps such an attitude is akin to prayer.

II

The first mood is unquestionably affective and of the pleasure-pain order. And does it not seem likely that in this case, at any rate, the crude stuff of pleasure is diffused, undifferentiated organic sensation? The after-flashes of organic hyperesthesia indicate that there had previously been a decided waking up of the internal periphery. The original mood seems to have had on its side the help of relations of congruity (perceptions of incongruousness), but had opposed to it the larger habitudes of propriety and respect, controlled by continuity relations of the larger "character" sort. Besides this relational aid, the forces opposed to the "tickled" mood seem to have had another relational ally, community relations that led auxiliary forces in favor of sympathy with the speaker, who was the unconscious cause of merriment. The real moving forces that give significance to the sensational and relational machinery appear to be certain impulsive tendency groups. The "merriment" group is at once egoistic and expressive (sense of humor). It is aided by more or less of superficial responsiveness and gregariousness, due to the *en rapport* between the observer and his friends. Opposed to this set of impulses were two others. The first might be called the ethical group, and has ingredients esthetic (good taste, tact), domestic (kindliness and loyalty), religious (reverence and respect), and the like. The second group opposing the hedonistic mood we may call scientific, for it was the motive underlying the introspective work done. While the scientific tendencies did not engage actively on the side of higher altruism and egoism, by their very presence they helped to tame and control the spasmodic and hysterical nuances of the mood of fun.

The second mood—that of indignation—is evidently muscular and emotional. Here we find muscular sensations functioning in diffused form as the raw material of the emotional direction of feeling (expansion, contraction, tension). The close affiliation of emotion with volitional activities seems to be indicated in this second mood. Indeed, while it would be proper to say that all three of these attitudes were affective moods, and good examples of them, nevertheless we may call the first affective *par excellence*, the second, volitional, the third, intellectual. The sustained endeavor superinduced by the second mood facilitates the coming on of the third mood of exalted perception, assimilation, and reflection.

The third mood shows us the third direction of feeling, sensi-

tivity-feeling (somesthesia: exaltation and depression). And it is interesting to note how this phase of feeling fits in with intellectual work, continuous attention, high-level interest. In this, as in previous studies already referred to, we find a sort of rhythmic circularity of affective phases, in which the dominant affective direction of this third mood—sensitivity-feeling—is highly intellectualized and usually unobtrusive. May it not be that when we are thinking our nervous activity is definitely related to the region of specialized sensation memories, and that, therefore, there is ordinarily little overflow of somesthesia? When a new thought occurs, possibly its sensational (image) content is unfixed, and what afterwards becomes associated imagery (words or what not) first functions as a lifting of the general level of the cœnesthesia, and especially of sensitivity-feeling.

Perhaps the most striking fact about the whole episode is this: the resemblance of the pleasurable mood to ticklishness; the localized and sensational supersensitiveness of the final mood and the organismic, affective hyperesthesia of the first mood; the interesting parallel of external and internal *sensation* of "tickling" as contrasted with the *attitude* or affective mood of "ticklishness."

III

Since the foregoing was written data have come to hand whereby an explanation may be hazarded of the ease with which the phases of sensation and feeling were studied introspectively. In the afternoon of the day on which the episode occurred, the observer found himself threatened with an attack of influenza. Though the attack was abortive, proof was given that on the occasion that gave rise to the conflicting moods the observer's peripheral nerve extremities in skin and mucous membrane, in joint and muscle, were in a hyperesthetic condition. The increased sensitiveness brought about experimental conditions of a slightly pathological kind.

If, then, as appears practically certain, the morning's mood was throughout peripherally conditioned, one is tempted to speculate a little, in the light of this case, as to the relation of sensation to feeling. The writer may be allowed to make a few schematic assumptions as to psychical first things. Taking the reflex arc as our analogical guide—without making any further claims—we may indulge in a few categorical descriptive statements. The three analytically separable, but not actually separated, aspects of consciousness are sensation (stimulus), relation (association), and impulse (reaction). Let us symbolize these as *S*, *R*, and *I*. Then, the formula for intellectual states *par excellence* would be *RSI* and

RIS; for volitional states, *IRS* and *ISR;* for affective states, *SIR* and *SRI*. *RSI* we may call affective intellectual, and *RIS* volitional intellectual; then, *IRS* would be intellectual volitional, and *ISR* affective volitional; *SRI* would be intellectual affective ("higher feelings"?), and *SIR* volitional affective ("coarser feelings"?).

If this crude nomenclature be provisionally accepted, I should say that the first mood in the episode described above (that of subdued merriment) could be called *SIR* changing to *SRI*. That is, relational control put the impulsive expressive element in the background. The second mood would be *SRI.SIR;* but in this case the *S* is kinesthesic, whereas in the first mood it was cœnesthesic or "organic" (organismic). In the third mood, *SRI* comes back again, but *S* is here somesthesic (epiperipheral sensitivity) and is tending to recede into the background in favor of *RIS*—voluntary attention.

So my thesis for this and similar cases may be put thus: Diffused, unlocalized "esthesia" determines affective moods. Relationized quality-content is material for perception and for intellectual states in general. In other words, when "quality" is in the functional foreground we have the sensation-in-time-and-space, perception; when "intensity" is dominant, we get "feeling," which may take either an impulsive or a relational direction. This last statement will remind my readers of Stout's account in *Mind* of Herbart's "presentative activity" and "presented content." Well, perhaps Herbart's "mythology" had a real basis in the fact that a sensation not only "stands for" something, but also "does" something. Indeed, the formula for every phase of consciousness is always some arrangement of *S, R,* and *I*. Returning to our original story, I should say that the diffused, organismic sensation-*feeling* of the mood of merriment (pleasure) is to be contrasted with the localized, organic sensation-*perception* of the last mood, when more or less localized and circumscribed "thrills of tickle" manifested themselves. So while I would not claim that pleasure is to be identified with tickling-sensation, I should suggest that tickling, whether outer or inner, is one form of organic sensation, which in its *diffused* form gives phases of pleasantness or unpleasantness, according to the condition of the organism, and in its *localized* form gives perception with a more clearly defined qualitative content. But what about physical pain? Our hypothesis answers this question. There are nerves of "common sensation" in the skin. When the stimulation of these "organic nerves" (for the skin has visceral functions) comes within certain medium limits, the result is pleaure, provided the condition of the cœnesthesis, the organismic *tout ensemble,* is appropriate. When the stimulation is defective or redundant, organic tissue suffers, and the resulting cœnesthesic dis-

turbance is felt as pain. Of course, "localization," "peculiar qualities," "local signs," and the like, are indications of perceptive synthesis—R is subordinating S, or is at least of equal importance. Now the phenomena of tickling and such cases as the one we have been studying bring out clearly the many possible varying shades between perception and feeling. Not strange is it that common language uses the word "feel" in both senses, and that psychologists are divided in their views as to the "sensational" theory of pain.[2]

THOMAS P. BAILEY.

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SOCIETIES

SECTION OF ANTHROPOLOGY AND PSYCHOLOGY OF THE NEW YORK ACADEMY OF SCIENCES

REPORT OF THE SECRETARY

A MEETING was held in conjunction with the New York Branch of the American Psychological Association on April 27, 1908. At the afternoon session, which was held in the Psychological Laboratory of Columbia University, Professor R. S. Woodworth presented a report on "Imagery of Time Relations," in which he noted the disproportion between our rich supply of time concepts and our meager perceptual experience of time, and proposed to test the hypothesis that time concepts were really composed of spatial concepts or images suffused with a temporal feeling. Mathematically, time can be represented by a point, or better a line or plane, moving along a line or axis, the present being any chosen position of the moving point, the past to the left, and the future to the right. All units and relations of time could be accurately represented in such a scheme. On examining a considerable number of persons, he found that such spatial representations of time occurred, though seldom, if ever, in a mathematically consistent form. Spatial forms for the year, as well as for the centuries, and for past and future, were not uncommon, being apparently considerably more common than the somewhat similar "number forms," though often less dis-

[2] My companions in merriment give unqualified and even enthusiastic endorsement to the description given above of the first mood of "being tickled." Inasmuch as they are well-educated and healthy individuals who have never studied psychology, I am inclined to think that their testimony has decided value, though they do not claim to have tried introspection on this or any other occasion.

tinct and less clearly conscious. But such time forms are not universally present; they have been found in about half of the forty individuals so far questioned. Of those who do not have them, some think of time concretely, *i. e.*, in terms of events or changes; while others employ what seem to be purely abstract concepts of time.

Mr. H. H. Woodrow made a report on "Reaction Time as Influenced by the Irregular Recurrence of the Stimulus." The object of the report was to show that reaction times for regularly recurring stimuli are considerably less than for irregular, providing the interval between the regularly recurring stimuli is not too long. As regards the effect of the interval, it was found that if the stimuli were irregular, there was very little difference in the reaction time for intervals varying from 0.8 sec. to 10.0 secs., while if the stimuli were given in regular succession the reaction time remained nearly constant for intervals from 0.8 sec. to about 4.0 secs., but increased with intervals longer than 4.0 secs.; and at 7.0 secs. was nearly as long as for totally irregular stimuli.

Professor Will S. Monroe presented the results of his experimental work on "Memories for Faces." He has used photographs as the material to be remembered, and by varying the conditions has determined several of the factors which contribute to the remembering or forgetting of a face once seen.

Professor Edward L. Thorndike, under the title, "Practise in a Purely Intellectual Function," reported an experiment in which 28 individuals multiplied mentally 95 examples, each consisting of a three-place number with no figure under 3, to be multiplied by a three-place number with no figure under 3. The work was done so as to occupy approximately sixteen days. Measuring the efficiency of the process inversely by the time taken (with an addition for each error of one tenth of the time per example) it was found that the median improvement for the 28 individuals was such as to give a reduction to 42 per cent. of the initial time. Some individuals improved two and a half times as much as others. The physiological limit for the function in question was, of course, not reached by any one in so short an experiment, but one individual, and possibly another also, did reach a point from which, within the limit of the experiment, no further improvement was made. The apparent differences in the change of rate of improvement were very great. On the supposition that the change of rate of improvement was due to one general law plus disturbing factors, Dr. Thorndike showed what this law would be on each of the two most likely hypotheses. The variability amongst individuals increased in the course of the experi-

ment, at least so far as concerns the differences between the upper quarter and the lower quarter of the 28 individuals. It would appear, therefore, that the experiment offered evidence that the influence of the environment is to accentuate rather than relieve initial inequalities of intellect. The experiment also offered evidence that within the field of so-called attention the influence of improvement in one mental function spreads little to other functions than it.

After dinner at the Faculty Club of Columbia University, an evening session was held at the American Museum of Natural History, the first paper being by Dr. H. A. Carr on "Involuntary Illusions of Depth." The paper gave a descriptive account of 48 cases gathered from a census of 350 students. The phenomenon consists of illusory transitions of the distance location of visual objects in the course of normal experience. The most pronounced fact was the lack of uniformity. The experiences were described under such headings as the kind of illusion, extent of visual field involved, character, direction, magnitude and rate of movement, changes in size and distinctness of the perceptual objects, degree of control possible, and such essential conditions as fatigue, mental absorption, ocular defects, steady fixation, etc. No explanation was attempted.

Dr. H. D. Marsh, speaking on the " Psychological Implicates of Certain Linguistic Expressions," showed how the study of the frequency of occurrence of sweeping terms, extensive and intensive, in diverse writings, could be made to yield valuable "internal evidence" regarding the authorship, and especially regarding personal and social characteristics. The intensive series of words included such positives as all, every, always, whoso, whatsoever, etc., and such negatives as no (adjective), none, nothing, no more, never, etc. The frequency of these words per 1,000 lines was determined for practically every book of the Bible, and it was found possible, with this single series of words, to follow most of the conclusions of the "higher critics" regarding disputed writings, both as to whole books and as to parts of books; and this with a high degree of reliability. Supplemented by an intensive series, this method would apparently work well.

A comparison of the first ten books of the Old Testament with the longest ten in the New Testament showed 33 per cent. more positives and 50 per cent. less negatives in the Old Testament. The following interpretations of this difference are suggested:

1. Biologically, it means lower *vs.* higher development, doing *vs.* thinking, prophet and law, warrior and deed in the earlier period *vs.* teacher and preaching, thinker and doctrine in the later period.

Faith, the product of bodily action, tends to exaggeration by positives; while doubt, due to mental activity, tends to exaggeration by negatives.

2. Sociologically, it means great social solidarity *vs.* relative individuality. The Hebrews, as selected and protected by Almighty Jehovah, developed a strong national pride and unanimity of thought and action; and this "crowd-spirit"—in the scientific sense—accounts for many irresponsible generalizations, since their prodigious national pride "not only idealized but magnified the past" in many references to it.

3. Psychologically, it means spontaneous imitation *vs.* intellectual initiative. Imitation tends to exclusions of negatives, while increasing intellectual horizon brings questionings and oppositions to accepted views. Sections rich in positives, as the writings of Paul and the first twelve chapters of Joshua, often indicate strong individualities, men of unrivaled force of character, of energetic action against great opposition. The masterful man in deed is likely, we infer, to put things strongly in expression.

Professor A. C. Armstrong discussed "The Idea of Feeling in Rousseau's Religious Philosophy." He remarked that Rousseau's religious philosophy was based on inner sentiment. The *sentiment intérieur* is subjective in the sense of individual and in the sense of inward. From both its individuality and its inwardness proceeds its certitude—which Rousseau highly values—and which depends also on a farther characteristic, the immediacy of the "inner light." Nevertheless, the *sentiment intérieur* is not exclusively affective in its nature, and when purely emotional, may vary through a wide range of affective experience. At its lowest level it amounts to the satisfaction of desire by religious ideas and principles. Or it may become shallow sentimentalism, as in the second half of the *Nouvelle Héloise.* A third and higher stage is the phase of pure religious aspiration, while in a fourth form it develops into an appreciation of religious values. This evaluating factor in Rousseau's religious thinking has been neglected; but it can be shown by quotation from many of his writings. In general it is evident that the idea of feeling in Rousseau requires careful analysis before well-grounded inferences can be drawn from his doctrine concerning either psychological or historical or constructive questions.

Mr. Max Eastman read a paper on "The Pragmatic Meaning of Pragmatism." The thesis of the paper was that pragmatism, in intellectualist terms, is skepticism with its logical consequences developed; and in pragmatist terms, the rejection of metaphysics as a serious discipline. This was shown to be consistent with the origin

of pragmatism in the biological attitude, which was developed in the writings of such philosophic scientists as Huxley and Clifford. It was then shown that as a dialectic implication of Mr. James's definition of meaning, metaphysics proper becomes not the most divine science, but the most meaningless science. It was stated that his failure to grasp this negative aspect of his definition is what gives obscurity to the whole contents and procedure of his book; it is what gives rise to the technical error of thinking that pragmatism is a confused and unthinkable theory, and the popular error of thinking it is a philosophy which consists in congratulating yourself upon your own prejudices.

In conclusion it was stated that the difference between the position of Professor James and that of Professor Dewey is chiefly this: that Professor Dewey understands the new definition of meaning to be a limitation of it and therefore a limitation of the field of serious inquiry, while Professor James does not. Professor Dewey endeavors to be consistently a pragmatist, while Professor James is satisfied with being simply pragmatic, as by the pragmatist's hypothesis we all are.

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REVIEWS AND ABSTRACTS OF LITERATURE

L'orientazione psicologica dell' etica e della filosofia del diritto. A. BONUCCI, Perugia, 1907. Pp. viii + 378.

Dr. Bonucci was already known to students of the philosophy of right as the author of "La legge comune nel pensiero greco" (1903) and "La derogabilità del diritto naturale nella scolastica" (1906), in which he had shown himself well qualified for treating historical problems. In tracing the origin and evolution of juridical doctrines of ancient and medieval thinkers he is painstaking, clear, and accurate, going to the original works themselves. In the latter work above-mentioned he shows that medieval thinkers were largely occupied in considering whether it were possible for God to break the natural law, and in showing how such a transgression, which, as coming from God, was necessarily just, ought to be regarded as just. He also shows that they saw clearly the problem of relative ethics together with the problem of absolute ethics, when they tried to determine whether in certain cases a transgression of the natural law by man could be just as answering to the necessities of practical life. Aristotle—especially Book V., of the Nicomachian Ethics—the principles of Roman law, certain passages of Scripture, and the consideration of practical needs were the sources of the problem of derogating from the law of nature.

Much less satisfactory is the critical part of the work. Not only has

the author no precise standard with which to measure the value of the doctrines expounded, but a philosophical interpretation of them is wanting; they appear often detached from the general system of ideas of the thinker and of the age. The author seems to be crushed by the quantity of his material. It has seemed proper to take into account these earlier publications of the author, because in the present work the same defects reappear, and are the more noticeable as the author abandons the historical field and attempts an independent treatment of a special problem in ethical and juridical philosophy. Even here the great mass of literature consulted by the author, and the extraordinary number of references, are remarkable, but all this erudition is more apt to confuse than to enlighten.

Dr. Bonucci rejects the usual distinction between practical and theoretical science. The so-called practical sciences simply point out, he says, certain relations between causes and effects which man, by a natural necessity, must take account of if he will obtain certain ends; but they do not prescribe the ends. Consequently there is no difference between practical and theoretical science, because the former, as well as the latter, gives only knowledge. But, if it is right to abolish the common distinction between the knowledge of nature and the knowledge of morality, it would be absurd to exclude from the field of ethical inquiries the study of the ends of human conduct and of the natural causes. Moral ends depend not only on our subjective feelings, but on our human nature. From this point of view, ends are an objective reality; they do not contradict the law of causation, but are the necessary effects of individual and social life. The exclusive application of the psychological method, as carried out by Dr. Bonucci, is the bankruptcy of ethics as a science. Moral ideals have a meaning only in relation to man, but man is not made only of subjective feelings, of continually changing states of consciousness. There is his human nature and his social environment; and in the fundamental characters of his nature and the general conditions of his existence are to be sought the content, the determining causes, and the justification of moral ends and ideals, which come thus to have a supreme objective value, transcending the mere subjective acts of valuation of the individual conscience. The denial of these objective elements in morality is the denial of morality itself.

Dr. Bonucci tells us that right, the subjective right, has no meaning apart from law. "The juridical norm is the expression of a supreme will directed towards an act, a human act." This supreme will is represented by the state, which implies the subjection of individual wills, but the state follows no particular standard in requiring a particular conduct from the community. What the ends of the state are remains obscure. What is a matter of feeling can become law, and what is law, imposed by the supreme will, can be abandoned by the state and given back to the individual conscience. As it is impossible to found ethics on mere feeling, it is equally impossible to found philosophy of law on mere will. Here, too, we must find a way out of the stream of merely subjective states of consciousness if a scientific position is to be attained.

UNIVERSITY OF PISA. GUGLIELMO SALVADORI.

La pellagre. A. MARIE. Paris: V. Giard & E. Brière. 1908. Pp. 3 + 252.

In this little work, which is the second volume of a series on social hygiene, the author considers the causes, signs and prophylaxis of pellagra. Pellagra is a disease of the nervous system characterized by degenerations of the nerve elements, by many profound changes in the functions of the skin, the alimentary canal, lungs, heart, etc. In severe cases the physical condition resembles that found in paresis, and the mental changes are similar. The disease is said to be caused by eating quantities of damaged maize. The fungi or smuts that infest the grain have been found to be harmless to animals and man and it appears probable that the disease is due to the toxins which are formed in the grain by the action of *sporisorium maidis, pencillium, oidium lactis maidis,* and numerous bacteria. Extracts of the damaged maize when injected into animals gave results similar to those of strychnine.

For the psychologist the important aspect of the disease is the mental side. It has already been said that in severe cases the mental symptoms simulate paresis. In the milder cases there are found: increasing irritability; failure of memory; transitory stupors with mutism, followed often by active delirium; stereotypies; hallucinations of hearing and vision, the latter often terrifying; fixed ideas of despair, fear, anxiety, persecution, poisoning, damnation, possession by devils or sorcerers; and tendency to suicide. There are many remissions in the course of the disease and some of the patients are cured.

In America there have recently been reported two cases in the southern Atlantic states, and it is probable that many more have not been recognized on account of the supposed rarity of the disease in this country.

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JOURNALS AND NEW BOOKS

THE PHILOSOPHICAL REVIEW. May, 1908. *The Objectivity of the Moral Judgment* (pp. 249–271): F. C. SHARP. – The moral judgment will be objective if it always and necessarily makes a claim whose validity can be determined by an appeal to facts. The moral judgment does make such a claim. *Self and Soul* (pp. 272–280): MARY WHITON CALKINS. – The self of philosophy is an immediately known and reflected-on reality. The affiliation between self and soul is obvious. The traditional soul doctrine suffers from conceiving soul after material analogy or as mere negation corporeal characters. *The Factual* (pp. 281–290): WALTER T. MARVIN. – "Are there judgments of which 'the factual' forms the complete warrant; and if so, how are these judgments related to the remainder of our knowledge?" The factual is what warrants an absolutely particular judgment. Factual judgments are starting points in

the discovery of truth. *Philosophy in France* (pp. 291–315): ANDRÉ LALANDE and EDOUARD LE ROY. – The movement of Couturat and Poincaré continues chiefly as pedagogic reform. From the naturalists have come "Le monde vegetal" by Bonnier, "Les transformations du règne animal" by Depéret, "Histoire de la terre" by de Launay and "Eléments de philosophie biologique" by Le Dantec. These provide a natural background for Bergson's "L'evolution créatrice." The other philosophical work of chief consequence is Hamelin's "Essai sur les éléments principaux de la représentation"; it expresses the Kantian tradition as modified by Renouvier. The liberal Catholic movement is producing much in the way of church history, history of dogma, exegesis, philosophy and psychology of religion. The attempt to revive the scholastic philosophy has failed. *Reviews of Books:* Wilhelm Wundt, *Völkerpsychologie:* H. N. GARDINER. F. C. S. Schiller, *Studies in Humanism:* HENRY BARKER. W. Mitchell, *Structure and Growth of the Mind:* NORMAN SMITH. *Notices of New Books. Summaries of Articles. Notes.*

Seashore, Carl E. *Elementary Experiments in Psychology.* New York: Henry Holt & Co. 1908. Pp. ix + 218.

Sharp, Frank Chapman. *A Study of the Influence of Custom on the Moral Judgment.* Bulletin of the University of Wisconsin, No. 236. Madison. 1908. Pp. 144. $0.30.

Teubner, B. G. *Verlag auf dem Gebiete der Mathematik, Naturwissenschaften und Technik nebst Grenzwissenschaften.* Leipzig & Berlin: B. G. Teubner. 1908. Pp. cxxxi + 392 + 92.

NOTES AND NEWS

TO THE EDITORS OF THE JOURNAL OF PHILOSOPHY, PSYCHOLOGY AND SCIENTIFIC METHODS

GENTLEMEN: I desire to make this brief statement of the aim and contents of my "Principles of Pragmatism," which is about to be published.

The most significant fact in recent philosophy is the conscious demand for a reconstruction of its method—not merely a patching up of the existing machinery of reflective thought, but a fundamental reconsideration of its whole purpose and procedure. This reconstruction implies:

1. The breaking down of the customary division of philosophy into theory-of-knowledge and theory-of-reality, and the treatment of these as phases of a general theory-of-experience. The course of discussion in the past few years between the leading schools of thought has made evident the need of a new statement of the issues involved. Neither idealism nor empiricism, neither absolutism nor pluralism, has been generally accepted. The truth must lie somewhere in their uncriticized postulates. The present work is an attempt to set forth the necessary assumptions of a

philosophy which is conceived as itself just method become self-conscious. Thinking is managing experience. Philosophy is method in such management.

2. The synthesizing of the fundamental underlying ideas in a form which the man of average intelligence and education may understand. In these days when the different branches of philosophy have themselves become professions, and the language which they speak has become as unintelligible to the layman as the technicalities of the special sciences, the need of this is obvious. It is the hope of the author that this book will aid in clarifying the meaning of the word "pragmatism" which at the present moment stands for so many apparently contradictory things to the minds of even its professed exponents. It is not the aim to construct a system, but to illustrate the workings of pragmatism as a philosophical principle in setting forth the basal conceptions of the new philosophy of experience.

H. HEATH BAWDEN.

PHILADELPHIA, PA.

FROM Professor Lloyd's article on "Plato's Philosophy as a Meditation on Death" in the July number of the *Harvard Theological Review,* we take the following: "Plato's vision of another world was more than an interesting pagan anticipation of the Christian belief in heaven. So to view it would be to make it only accidental or miraculous; a result that would neither bring credit to Plato nor deepen the truth of Christianity. It was indeed an anticipation, but also it was Plato's own answer to, his very natural defense against, that blindly obstinate, brutally selfish, ingenious, but not genuine, conservatism of his time. His other-world realism was relative to the persistent unrealism at Athens. It was, again, just his cry of victory, his triumph over the despair, deeply evident to him, of Greek civilization."

THE July *Century* contains an article by Professor Ladd on "The Business Morals of Japan." It is an attempt to estimate the charge that the business morals of the Japanese are of a relatively low order, and makes the following statement about the teaching of ethics in Japan: "In all the government business colleges and schools of commerce the study of ethics now forms one of the principal topics of the required course. Indeed, from the primary grades of the public school to the graduate classes of the university, morals is one of the subjects most insisted upon in the national system of education."

THE Athens correspondent of the London *Times* reports that two archeological discoveries of considerable importance have been made. The excavations carried out in the Altis or sacred precincts of Olympia, near the great altar of Zeus, under the superintendence of Professor Dorpfeld, have resulted in the discovery of interesting remains of the Neolithic period, including house-vessels and implements. Thus it is evident that Olympia was a place of human habitation more than two thousand years before Christ. In Sparta the members of the British School have brought to light a large number of interesting terra-cotta figurines of the fifth century before Christ.